REMARKS

Originally filed claims 1-8 have been canceled and new claims 9-17 have been added. Now in the application are claims 9-17, of which claims 9, 12, 13 and 16 are independent. No new matter has been introduced. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Claim Amendment

Applicants have canceled originally filed claims 1-8, and added new claims 9-17 to clarify the scope of the claimed invention. Clams 9, 12, 13 and 16 are independent. Claim 9, which corresponds to claims 1, 4 and 5, is directed to a hydrogen-occlusion alloy regenerating apparatus. Claims 10 and 11, which correspond to claims 2 and 3, respectively, depend on claim 9. Claim 12, which corresponds to claim 8, is directed to a hydrogen-occlusion alloy regenerating apparatus for use in a fuel cell power generating system. Claims 13-16 are method claims that parallel claims 9-12, respectively. Claim 17, which corresponds to claim 6, depends on claim 16. No new matter has been added.

Objections to Specification

The disclosure is objected to because of the informalities in the specification. In response to the objections, Applicants have changed "MH1" to --MH2-- on page 10, line 14, "litters" to --liters-- on page 14, line 2, and "the third flowmeter 52" to --the fourth flowmeter 52-- on page 15, line 12. In light of the amendment, Applicants submit that the specification is in condition for allowance.

Claim Rejections

Claims 1-8 are rejected under U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In response to the rejections, Applicants have canceled originally filed claims 1-8 and added new claims 9-17. Applicants believe that the new claims properly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants therefore request the withdrawal of the Examiner's rejection under U.S.C. §112, second paragraph.

Art Rejections – Claims 1,2, 4, 5 and 8

Claims 1, 2, 4, 5 and 8 are rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent Publication No. 08-094610 of Imoto et al. (the Imoto reference). Applicants respectfully submit that the new claims are not anticipated by the Imoto reference.

Claims 9 and 12 recite a hydrogen-occlusion alloy regenerating apparatus comprising a deterioration detecting means, a remaining-amount detecting means and a heating means for heating the hydrogen-occlusion alloy to remove the impurities by the released hydrogen. The hydrogen-occlusion alloy is heated based on both the detection signals from the remaining-amount detecting means and the deterioration detecting means. Claims 13 and 16, which recite a method for regenerating a hydrogen-occlusion alloy, parallel claims 9 and 12, respectively.

The Imoto reference relates to detecting the ratio of gas including hydrogen in a heat utilization system. The Imoto reference describes a hydrogen-occlusion alloy regenerating apparatus that is constructed to heat a hydrogen-occluded alloy by a heater and evacuate the inside of a vessel by a vacuum pump. The Imoto reference discloses a mass flow meter (4) for measuring effective amount of hydrogen movement from a second container (2) to a first container (1), both containers being filled with hydrogen-occlusion alloy. The concentration of the gas other than hydrogen is calculated from the measured data of the effective amount of hydrogen movement, and if the concentration exceeds a predetermined limit value, heaters (8, 9) operates to regenerate the hydrogen-occlusion alloy in the first and second containers.

Applicants submit that the Imoto reference fails to disclose all of the claim elements of claims 9, 12, 13 and 16. The Imoto reference fails to disclose that the remaining-amount detecting means detect a remaining amount of hydrogen occluded in the hydrogen-occlusion alloy and send a detection signal when an internal pressure of the hydrogen reservoir caused by a released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir, that is, when the hydrogen reservoir is in a state not damaged by the internal pressure, as recited in claims 9, 12, 13 and 16. The Imoto reference discloses only measuring effective amount of hydrogen movement between two containers and determining the concentration of gas other than hydrogen. The Imoto reference discloses detecting the concentration of gas other than hydrogen in the containers. The Imoto reference does not disclose detecting a remaining amount of hydrogen in the hydrogen-occlusion alloy. In light of the aforementioned argument, the Imoto reference fails to disclose all

of the claim elements of claims 9, 12, 13 and 16. Applicants therefore submit that new claims are not anticipated by the Imoto reference.

Art Rejections – Claims 3 and 4

Claims 3 and 4 are rejected under 35 U.S.C. §103(a) as being unpatentable over the Imoto reference. Applicants respectfully submit that the claimed invention is not obvious over the Imoto reference.

Applicants note that the Imoto reference fails to teach or suggest all of the claim limitations of the claimed invention. The Imoto reference teaches a mass flow meter for measuring effective amount of hydrogen movement between containers containing hydrogen-occlusion alloy. In the Imoto reference, the concentration of the gas other than hydrogen is calculated from the measured data of the effective amount of hydrogen movement. The Imoto reference fails to teach or suggest that the remaining amount detection means detect the remaining amount of hydrogen in the hydrogen-occlusion alloy and generate a signal when an internal pressure of the hydrogen reservoir caused by a released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir, as recited in claim 9, 12, 13 and 16. The Imoto reference teaches only measuring effective amount of hydrogen movement between two containers and determining the concentration of gas other than hydrogen. The Imoto reference does not teach detecting a remaining amount of hydrogen in the hydrogen-occlusion alloy. In light of the aforementioned argument, the Imoto reference fails to teach or suggest all of the claim

limitations of claim 9, 12, 13 and 16. Applicants therefore submit that the claimed invention is not obvious over the Imoto reference.

Art Rejections – Claim 6

Claim 6 are rejected under 35 U.S.C. §103(a) as being unpatentable over the Imoto reference in view of U.S. Patent No. 5,976,725 of Gamo et al. (the Gamo reference). Applicants respectfully submit that new claim 17, which corresponds to claim 6, is not obvious over the cited references.

The Gamo reference teaches the connecting structure between a fuel cell and a hydrogen reservoir. The Gamo reference does not teach or suggest that a remaining-amount detecting means detect a remaining amount of hydrogen occluded in the hydrogen-occlusion alloy and send a detection signal when an internal pressure of the hydrogen reservoir caused by a released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir, that is, when the hydrogen reservoir is in a state not damaged by the internal pressure, as recited in claim 16. In light of the argument set forth above, the Imoto and Gamo references fail to teach or suggest all of the claim elements of claim 16. Claim 17, which depends on claim 16, is not rendered obvious over the cited references. Applicants therefore submit that claim 17 is not obvious over the Imoto and Gamo references.

Art Rejections – Claims 7

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over the Imoto reference in view of Japanese Patent Publication No 06-193996 of Sato et al. (the Sato reference). Claim 7 has been canceled and the subject matter of claim 7 has not been introduced in the new claims. Applicants therefore submit that the rejection of claim 7 is moot and the new claims are in condition for allowance.

CONCLUSION

In light of the aforementioned amendment and argument, Applicants contend that each of the Examiners rejections have been adequately addressed and the pending application is in condition for allowance.

Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made".** Should the Examiner feel that a telephone conference with Applicants' attorney would expedite prosecution of this application, the Examiner is urged to contact the Applicants' attorney at (617) 227-7400.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims

Please cancel claims 1-8.

Please add new claims 9-17 as follows:

9. (New) A hydrogen-occlusion alloy regenerating apparatus comprising a deterioration detecting means for sending a detection signal when a hydrogen-occlusion alloy filled in a hydrogen reservoir and capable of occluding and releasing hydrogen has been deteriorated due to the deposition of impurities, a remaining-amount detecting means for detecting a remaining amount of hydrogen occluded in the hydrogen-occlusion alloy and for sending a detection signal when an internal pressure of said hydrogen reservoir caused by a released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir, and a heating means for heating the hydrogen-occlusion alloy to remove the impurities by the released hydrogen, based on both the detection signals from the remaining-amount detecting means and the deterioration detecting means.

10. (New) A hydrogen-occlusion alloy regenerating apparatus according to claim 9, wherein said deterioration detecting means detects an amount of hydrogen occluded in said hydrogen-occlusion alloy, and sends the detection signal if the amount of hydrogen occluded is smaller than an amount of hydrogen occluded when the hydrogen-occlusion alloy is normal.

11. (New) A hydrogen-occlusion alloy regenerating apparatus according to claim 9, wherein said deterioration detecting means detects a rate of occlusion of hydrogen in said hydrogen-occlusion alloy, and sends the detection signal when the hydrogen occlusion rate is lower than a hydrogen occlusion rate provided when the hydrogen-occlusion alloy is normal.

12. (New) A hydrogen-occlusion alloy regenerating apparatus for use in a fuel cell power generating system, the fuel cell power generating system including a reformer for producing a reformed gas containing hydrogen from a starting fuel, a fuel cell supplied with said reformed gas, a hydrogen reservoir containing a hydrogen-occlusion alloy capable of occluding and releasing the hydrogen in said reformed gas, and supplying the hydrogen released from said hydrogen-occlusion alloy to said fuel cell,

wherein said hydrogen-occlusion alloy regenerating apparatus comprises a deterioration detecting means for sending a detection signal when said hydrogen-occlusion alloy has been deteriorated due to the deposition of impurities in said reformed gas, a remaining-amount detecting means for detecting a remaining amount of hydrogen occluded in the hydrogen-occlusion alloy and for sending a detection signal when an internal pressure of said hydrogen reservoir caused by the released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir, and a heating means for heating the hydrogen-occlusion alloy to remove the impurities by the released hydrogen, based on both the detection signals from the remaining-amount detecting means and the deterioration detecting means.

13. (New) A method of regenerating a hydrogen-occlusion alloy comprising the steps of: generating a deterioration detection signal when a hydrogen-occlusion alloy filled in a hydrogen reservoir and capable of occluding and releasing hydrogen has been deteriorated due to the deposition of impurities; detecting a remaining amount of hydrogen occluded in the hydrogen-occlusion alloy and generating a remaining-amount detection signal when an internal pressure of said hydrogen reservoir caused by a released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir; and heating the hydrogen-occlusion alloy to remove the impurities by the released hydrogen, based on both the deterioration detection signal and the remaining-amount detection signal.

14. (New) A method of regenerating a hydrogen-occlusion alloy according to claim 13, wherein said deterioration detection signal is generated when an amount of hydrogen occluded in said hydrogen-occlusion alloy is detected to be smaller than an amount of hydrogen occluded when the hydrogen-occlusion alloy is normal.

15. (New) A method of regenerating a hydrogen-occlusion alloy according to claim 13, wherein said deterioration detection signal is generated when a rate of occlusion of hydrogen in said hydrogen-occlusion alloy is detected to be lower than a hydrogen occlusion rate provided when the hydrogen-occlusion alloy is normal.

16. (New) A method of regenerating a hydrogen-occlusion alloy in a fuel cell power generating system, the fuel cell power generating system including a reformer for producing a reformed gas containing hydrogen from a starting fuel, a fuel cell supplied with said reformed gas, a hydrogen reservoir containing a hydrogen-occlusion alloy capable of occluding and releasing the hydrogen in said reformed gas, and supplying the hydrogen released from said hydrogen-occlusion alloy to said fuel cell,

the method comprising the steps of: generating a deterioration detection signal when said hydrogen-occlusion alloy has been deteriorated due to the deposition of impurities in said reformed gas; detecting a remaining amount of hydrogen occluded in the hydrogen-occlusion alloy and generating a remaining-amount detection signal when an internal pressure of said hydrogen reservoir caused by the released hydrogen corresponding to the hydrogen remaining in the hydrogen-occlusion alloy is not more than an upper limit pressure used in the hydrogen reservoir; and heating the hydrogen-occlusion alloy to remove the impurities by the released hydrogen, based on both the deterioration detection signal and the remaining-amount detection signal.

17. (New) A hydrogen-occlusion alloy regenerating method according to claim 16, wherein the hydrogen released from said hydrogen-occlusion alloy is utilized for operating said fuel cell.

In the Specification

Please replace the paragraph starting page 9, line 24 with the following paragraph:

Hydrogen produced by the reformer 3 can be occluded in the hydrogen reservoir 43, and the occluded hydrogen can be released from the hydrogen reservoir 43. The first storage section 44 includes a so-called through-type tank having an inlet and an outlet. The inlet is connected to an upstream portion of the second bypass line 39, while the outlet is connected to a downstream portion of the second bypass line 39, and a first hydrogen-occlusion alloy MH1 is filled in the tank. The second storage section 51 includes an ordinary tank having an outlet also serving as an inlet, and a second hydrogen-occlusion alloy MH2 is filled in the tank. As shown in Fig. 2, the first hydrogen-occlusion alloy MH1 is of a low-pressure occluding/high-temperature releasing type and has characteristics to occlude hydrogen at 80°C under 0.15 MPa and to release hydrogen at 130°C under 0.8 MPa. As such a hydrogen-occlusion alloy, $LaNi_{3.96}Co_{0.6}Al_{0.44}$ may be used. The second hydrogen-occlusion alloy [MH1] MH2 is of a high-pressure occluding/low-temperature releasing type, and has characteristics to occlude hydrogen at 60°C under 0.5 MPa and to release hydrogen at 30°C under 0.15 MPa. As such a hydrogen-occlusion alloy, $NmNi_{4.04}Co_{0.6}Mn_{0.31}Al_{0.5}$ (Mn is misch metal) may be used.

Please replace the paragraph starting page 13, line 17 with the following paragraph:

The regenerating treatment for the second hydrogen-occlusion alloy MH2 is conducted by heating the second hydrogen-occlusion alloy MH2 and maintaining it at a temperature of 120°C for 10 minutes to release hydrogen from the second hydrogen-occlusion alloy MH2. In this case, an amount of hydrogen occluded of at least about 0.015 % by weight is required for the regeneration of the second hydrogen-occlusion alloy MH2 made of the above-described material.

When the total sum of the volume in the second storage section 51 and the volume in the line extending from the second storage section 51 to the thirteenth two-way valve V13 is 3 [litters] liters, if the upper limit pressure used in the second storage section 51 is set at 1 MPa, an amount of hydrogen occluded of 0.037 % by weight at 120°C is an upper limit value for the amount of hydrogen released to satisfy such a regenerating treatment.

Please replace the paragraph starting page 15, line 11 with the following paragraph:

A deterioration detection signal and a remaining-amount detection signal from the [third] fourth flowmeter 52 are transferred to the ECU 60, and the switch 55 of the heating circuit 56 is opened and closed under the control of the ECU 60 based on both the signals.